The tip disposal tube 342 comprises an upstanding tubular member. During specimen transfer from a specimen tube 320 to a reaction receptacle 160, an elongated pipette tip is frictionally secured onto the end of the tubular probe 457 of the pipette unit 456, so that specimen material does not come into contact with the tubular probe 457 of the pipette unit 456 when material is drawn from a specimen tube 320 and into the elongated pipette tip. After a specimen has been transferred from a specimen tube 320, it is critical that the pipette tip used in transferring that specimen not be used again for another unrelated specimen. Therefore, after specimen transfer, the pipette unit 456 moves to a position above the tip disposal tube 342 and ejects the used, disposable pipette tip into the tip disposal tube 342 which is connected to one of the solid waste containers carried in the lower chassis 1100.

An elongated pipette tip is preferably also frictionally secured to the probe 457 for transferring target capture reagent from containers carried on the multi-axis mixer 400 to a reaction receptacle 160. Following reagent transfer, the pipette tip is discarded.

As noted, the specimen ring 250, the pipette tip wheel 350, and the multi-axis mixer 400 are preferably mounted on a hinged jig plate 130 (see FIGURES 5 and 6) supported above the datum plate 82. The jig plate 130 is hinged at a back end 132 thereof (see FIGURE 6) so that the plate, and the ring 250, the wheel 350, and the mixer 400 mounted thereon, can be pivoted upwardly to permit access to the area of the chemistry deck below the jig plate.

A first, or right-side, transport mechanism 500 is mounted on the datum plate 82 below the jig plate 130 and specimen ring 250 on generally the same plane as the input queue 150. Transport mechanism 500 includes a rotating main body portion 504 defining a receptacle carrier assembly and an extendible manipulating hook 506 mounted within the main body 504 and extendible and retractable with respect thereto by means of a powered hook member drive assembly. Each of the reaction receptacles 160 preferably includes manipulating structure that can be engaged by the extendible manipulating hook 506, so that the transport mechanism 500 can engage and manipulate a reaction receptacle 160 and move it from one location on the processing deck 200 to another as the reaction receptacle is sequentially moved from one station to another during the performance of an assay within the reaction receptacle 160.

A second, or left-side, transport mechanism 502, of substantially identical construction as first transport mechanism 500, is also included on the processing deck 200.

A plurality of receptacle parking stations 210 are also located below the jig plate 130. The parking stations 210, as their name implies, are structures for holding specimen-containing

reaction receptacles until the assay performing stations of the processing deck 200 of the analyzer 50 are ready to accept the reaction receptacles. The reaction receptacles are retrieved from and inserted into the parking stations 210 as necessary by the transport mechanism 500.

A right-side orbital mixer 550 is attached to the datum plate 82 and receives reaction receptacles 160 inserted therein by the right-side transport mechanism 500. The orbital mixer is provided to mix the contents of the reaction receptacle 160. After mixing is complete, the right-side transport mechanism 500 removes the reaction receptacle from the right-side orbital mixer 550 and moves it to another location in the processing deck.

A number of incubators 600, 602, 604, 606, of substantially identical construction are provided. Incubators 600, 602, 604, and 606 are preferably rotary incubators. Although the particular assay to be performed and the desired throughput will determine the desired number of necessary incubators, four incubators are preferably provided in the analyzer 50.

As will be described in more detail below, each incubator (600, 602, 604, 606) has a first, and may also have a second, receptacle access opening through which a transport mechanism 500 or 502 can insert a reaction receptacle 160 into the incubator or retrieve a reaction receptacle 160 from the incubator. Within each incubator (600, 602, 604, 606) is a rotating receptacle carrier carousel which holds a plurality of reaction receptacles 160 within individual receptacle stations while the receptacles are being incubated. For the nucleic acid-based diagnostic assay preferably performed on the analyzer 50 of the present invention, first rotary incubator 600 is a target capture and annealing incubator, second rotary incubator 602 is an active temperature and pre-read cool-down incubator (also known as an "AT incubator"), third rotary incubator 604 is an amplification incubator, and fourth rotary incubator 606 is a hybridization protection assay incubator. The construction, function, and role of the incubators in the overall performance of the assay will be described in more detail below.

The processing deck 200 preferably also includes a plurality of temperature ramping stations 700. Two such stations 700 are shown attached to the datum plate 82 between incubators 602 and 604 in FIGURE 3. Additional ramping stations may be disposed at other locations on the processing deck 200 where they will be accessible by one of the transport mechanisms 500, 502.

A reaction receptacle 160 may be placed into or removed from a temperature ramping station 700 by either transport mechanism 500 or 502. Each ramping station 700 either raises or lowers the temperature of the reaction receptacle and its contents to a desired temperature before

the receptacle is placed into an incubator or another temperature sensitive station. By bringing the reaction receptacle and its contents to a desired temperature before inserting it into one of the incubators (600, 602, 604, 606), temperature fluctuations within the incubator are minimized.

The processing deck 200 also includes magnetic separation wash stations 800 for performing a magnetic separation wash procedure. Each magnetic separation wash station 800 can accommodate and perform a wash procedure on one reaction receptacle 160 at a time. Therefore, to achieve the desired throughput, five magnetic separation wash stations 800 working in parallel are preferred. Receptacles 160 are inserted into and removed from the magnetic separation wash stations 800 by the left-side transport mechanism 502.

A reagent cooling bay 900 is attached to the datum plate 82 roughly between the incubators 604 and 606. Reagent cooling bay 900 comprises a carousel structure having a plurality of container receptacles for holding bottles of temperature sensitive reagents. The carousel resides within a cooled housing structure having a lid with pipette-access holes formed therein.

A second, or left-side, orbital mixer 552, substantially identical to right-side orbital mixer 550, is disposed between incubators 606 and 604. The left-side orbital mixer 552 includes dispenser nozzles and lines for dispensing fluids into the reaction receptacle resident within the left-side orbital mixer 552.

A reagent pipette assembly, or robot, 470 includes a double gantry structure attached to the frame structure 62 (see FIGURE 2) and is disposed generally above the incubators 604 and 606 on the left-hand side of the processing deck 200. Specifically, reagent pipette assembly 470 includes pipette units 480 and 482. Pipette unit 480 includes a tubular probe 481 and is mounted for linear movement, generally in the X-direction, along track 474 of lateral rail 476, and pipette unit 482, including a tubular probe 483, is also mounted for linear motion, generally in the X-direction, along track 484 of lateral rail 478. Lateral rails 476 and 478 can translate, generally in a Y-direction, along the longitudinal track 472. Each pipette unit 480, 482 provides independent vertical, or Z-axis, motion of the respective probe 481, 483. Drive mechanisms within the assembly 470 position the pipette units 480, 482 to the correct X, Y, Z coordinates within the analyzer 50 to pipette fluids, to wash the tubular probes 481, 483 of the respective pipette units 480, 482, or to stow the pipette units 480, 482 during periods of nonuse, e.g., in "home" positions. Each axis of the pipette assembly 470 is driven by a stepper motor.